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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/530,883	04/11/2005	Yoshitaka Sugawara	3688KE-1	9237

22442 7590 04/26/2007
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DENVER, CO 80202

EXAMINER

SEFER, AHMED N

ART UNIT	PAPER NUMBER
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2826

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/26/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/530,883	Applicant(s) SUGAWARA, YOSHITAKA	
	Examiner A. Sefer	Art Unit 2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,5,7,8,10,11,17 and 18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,5,7,8,10,11,17 and 18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The amendment filed February 2, 2007 has been entered. Claims 2-4, 6, 9 and 12-16 have been cancelled and new claims 17 and 18 have been added.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the **stacking faults** as recited in the new claim 17 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will

Art Unit: 2826

be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. Claims 1 and 18 are objected to because of the following informalities: To avoid any redundancy, the recitation of claims 1 and 18 calling for, “heating means for heating ...” should read “means for heating ...”.

Claim 7 is objected to because of the following informalities: The recitation calling for, “wherein said heating means is an electric heater provided heat said wide-gap bipolar semiconductor element” contains grammatical error. For purposes of examination, it will be assumed to read, “wherein said heating means is an electric heater providing heat to said wide-gap bipolar semiconductor element.”

Appropriate correction is required.

4. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

The recitation of claim 5 calling for, “said heating means heats ...” lacks proper antecedent basis.

The recitation of claim 7 calling for, “said heating means is ...” lacks proper antecedent basis.

The recitation of claim 8 calling for, “said heating means is ...” lacks proper antecedent basis.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The following is a quotation of 35 U.S.C. § 112, sixth paragraph, which forms the basis for determining interpreting certain forms of functional language in claims:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof. 35 USC 112 paragraph 6.

7. According to MPEP 2181, limitations in amended claim 1 and newly submitted claim 18 will be presumed to invoke 35 U.S.C. 112, sixth paragraph, if the following 3-prong analysis are met:

- (A) the claim limitations must use the phrase "means for" or "step for;"
- (B) the "means for" or "step for" must be modified by functional language; and
- (C) the phrase "means for" or "step for" must not be modified by sufficient structure, material, or acts for achieving the specified function.

With respect to part A, the claim limitations in claims 1 and 18 use the phrase "means for."

With respect to part B, the claim limitations in claims 1 and 18 are modified by functional language calling for, "heating said wide-gap bipolar semiconductor element in side said semiconductor package at a temperature of 125 °C or more.

With respect to part C, the claim limitations in claims 1 and 18 are not be modified by sufficient structure.

Therefore, claims 1, 18, and all other claims that depend from claim 1 are presumed to invoke 35 U.S.C. 112, sixth paragraph and the claim limitations shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof. In the instant case, the limitation, "means for heating" will be construed to cover a heater having a nichrome wire and a heat sink (see pp. 27 and 51, lines 7-11 and 13-15 respectively).

8. Claims 1, 8, 11 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugawara JP-2002-325355 ("Sugawara '55") (of record) in view of Sugawara, "Recent Progress in Sic Power Device Developments and Application Studies," April 14-17, 2003, Cambridge, UK. pp. 10-18 ("Sugawara '03").

Sugawara '55 discloses in figs. 1-4 a semiconductor device comprising: a wide-gap bipolar semiconductor element 24/26 using a wide-gap semiconductor and having a built-in voltage in the forward direction, a semiconductor package 1010 accommodating said wide-gap bipolar semiconductor element and having electrical connection means (106, 1289A, 1289B, 128) for connecting said wide-gap bipolar semiconductor element to external apparatuses, but does not specifically disclose heating means.

Sugawara '03 discloses (pp. 12 and 15, numeral III and V, B respectively) a semiconductor device comprising: a wide-gap bipolar semiconductor element and a compact heat sink.

Therefore, in view of Sugawara '03's teachings, one having an ordinary skill in the art at the time the invention was made would be motivated to modify Sugawara '55 by incorporating a heat sink. The motivation for doing so would have been to reduce the built-in potential and lower total power loss as taught by Sugawara (page 15, left col., first par.). Therefore, it would have

Art Unit: 2826

been obvious to combine Sugawara '55 and Sugawara '03 to yield the device structure as recited in claim 1.

Re claim 8, Sugawara '03 discloses (pp. 12 and 15, numeral III and V, B respectively) a heat sink that raises the temperature of said wide-gap bipolar semiconductor element. Sugawara '03' teaches a compact heat sink which is understandably capable of receiving and dissipating heat; thus the limitation, "by controlling a radiation of heat generated when said wide-gap bipolar semiconductor element is energized" is met.

RE claim 11, Sugawara '55 discloses (see paragraph [41] of machine translated document) the wide-gap bipolar semiconductor element 24/26 being a gate drive type SiC-GTO thyristor. Thus, the limitation, "the wide-gap semiconductor being a self-excited thyristor" is met.

Re claim 17, Sugawara '03 discloses (page 12, numeral III) the existence of several SiC crystal defects. Note that stacking faults are one type crystal defects.

9. Claims 1, 5, 7, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Sugawara '55" in view of Tato ("Tato") JP 9-148681.

Sugawara '55 discloses in figs. 1-4 a semiconductor device comprising: a wide-gap bipolar semiconductor element 24/26 using a wide-gap semiconductor and having a built-in voltage in the forward direction, a semiconductor package 1010 accommodating said wide-gap bipolar semiconductor element and having electrical connection means (106, 1289A, 1289B, 128) for connecting said wide-gap bipolar semiconductor element to external apparatuses, but does not specifically disclose heating means.

Tato discloses in figs. 1 and 2 a semiconductor device comprising: a wide-gap semiconductor element and a heater.

Therefore, in view of Tato's teachings, one having an ordinary skill in the art at the time the invention was made would be motivated to modify Sugawara '55 by incorporating a heater. The motivation for doing so would have been to raise the temperature of the device as taught by Tato. Therefore, it would have been obvious to combine Sugawara '55 and Tato to yield the device structure as recited in claim 1.

Re claim 5, Tao discloses said heating means heats the semiconductor element. Tato also discloses (see abstract) that the heater is not used at the time of high temperature operation of the semiconductor element; thus, the recitation calling for, "in advance before the start of the operation of said wide-gap bipolar semiconductor element" is met.

Re claim 7, Tato discloses (see paragraph [0006] of machine translated document) the heater includes a NiCr (similar to applicants discloses heater including nichrome); thus, the recitation calling for, "said heating means is an electric heater providing heat to said wide-gap bipolar semiconductor element" is met.

Re claim 10, Tato discloses (see abstract) a temperature sensor 10 to monitor the temperature of the semiconductor element and a temperature control circuit (not shown); thus, the recitation calling for, "wherein said semiconductor package has a temperature sensor for detecting the temperature of said wide-gap bipolar semiconductor element and a temperature controller that keeps the temperature of said wide-gap bipolar semiconductor element at a temperature of 125 °C or more on the basis of a detection output of said temperature sensor" is met.

Art Unit: 2826

10. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over “Sugawara ‘55” in view of Tato.

Sugawara ‘55 discloses in figs. 1-4 a semiconductor device comprising: a wide-gap bipolar semiconductor element 24/26 using a wide-gap semiconductor and having a built-in voltage in the forward direction, a semiconductor package 1010 accommodating said wide-gap bipolar semiconductor element and having electrical connection means (106, 1289A, 1289B, 128) for connecting said wide-gap bipolar semiconductor element to external apparatuses, but discloses neither heating means nor temperature sensor nor controller.

Tato discloses (figs. 1 and 2 and abstract) a semiconductor device comprising: a wide-gap semiconductor element and a heater (heating means); a temperature sensor 10; and a temperature control circuit (not shown).

Therefore, in view of Tato’s teachings, one having an ordinary skill in the art at the time the invention was made would be motivated to modify Sugawara ‘55 by incorporating a heater, a temperature sensor; and a temperature controller. The motivation for doing so would have been to raise, monitor and adjust the temperature of the device, as taught by Tato. Therefore, it would have been obvious to combine Sugawara ‘55 and Tato to yield the device structure as recited in claim 18.

Response to Arguments

11. Applicant's arguments with respect to claims 1, 5, 7, 8, 10 and 11 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Sefer whose telephone number is (571) 272-1921.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on (571) 272-1236.

Art Unit: 2826

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ANS

April 20, 2007



A. Sefer
Patent Examiner
Art Unit 2826